Dual

Service Manual Dual 1209

Edition 1 E 1209

Technical specifications

Power source:	alternating current, 50 or 60 Hz, depending on choice of interchangeable motor pulley.
Supply voltage:	110, 117 or 220 volts, switchable
Drive system:	4-pole, split-pole synchronous motor with radially located elastic mounts. Transmission to turntable platter via highly wear-resistant, compliant idler wheel.
Power consumption (unloaded):	approx. 7.8 watts
Current consumption (unloaded):	at 220 volts, 50 Hz, approx. 64 mA at 117 volts, 60 Hz, approx. 115 mA
Turntable platter:	non-magnetic, 1.8 kg (4 lb), 270 mm (10.5 in.) diameter. Moment of inertia: $1{,}9 \cdot 10^5$ gram cm/sec².
Turntable speeds:	33 ⅓, 45 and 78 rpm
Pitch adjustment range:	6% on all three speeds (approx. 1 musical semitone)
Speed variation (flutter and wow):	± 0.09% according to DIN 45 507
Rumble and other noise:	unweighted, −42 dB weighted, −57 dB according to DIN 45 500
Tonearm:	torsionally rigid, all-metal construction, on vertical needle bearings and on horizontal 2-layer precision ball bearings with hardened and polished races.
Cartridge holder:	removable, accepts all types of cartridges weighting between 1 and 12 grams and having internationally standard ½" mounting centers.
Counterbalance weight:	provision for fine balancing in 0.01-gram click stops. Braked against unintentional rotation.
Weight:	4.9 kg (10¾ lb) less packing
Mounting dimensions and mounting-board cut-out:	obtainable from mounting instructions.

Dual Gebrüder Steidinger 7742 St. Georgen/Schwarzwald

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Fig. 1 Tonearm hook-up schematic

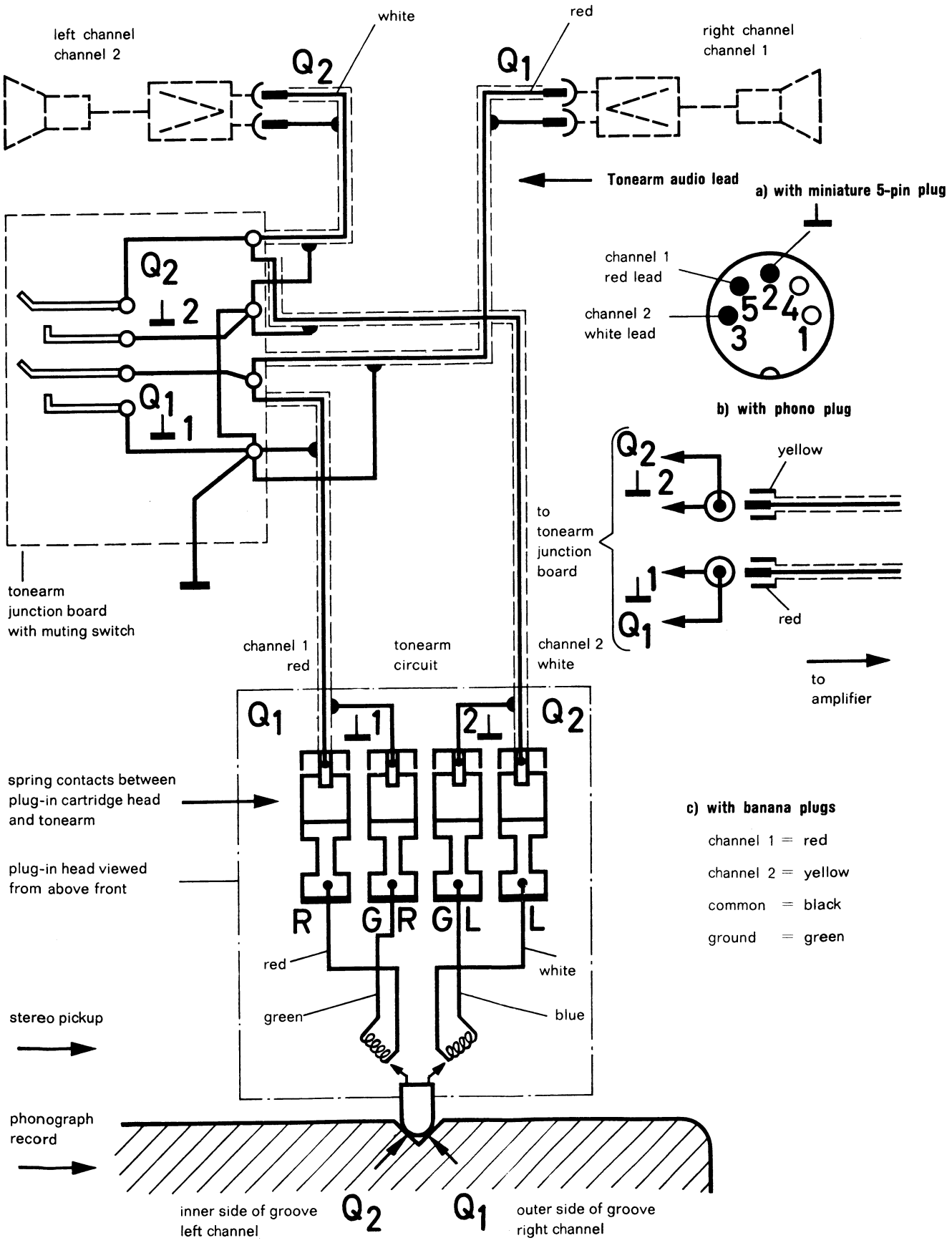

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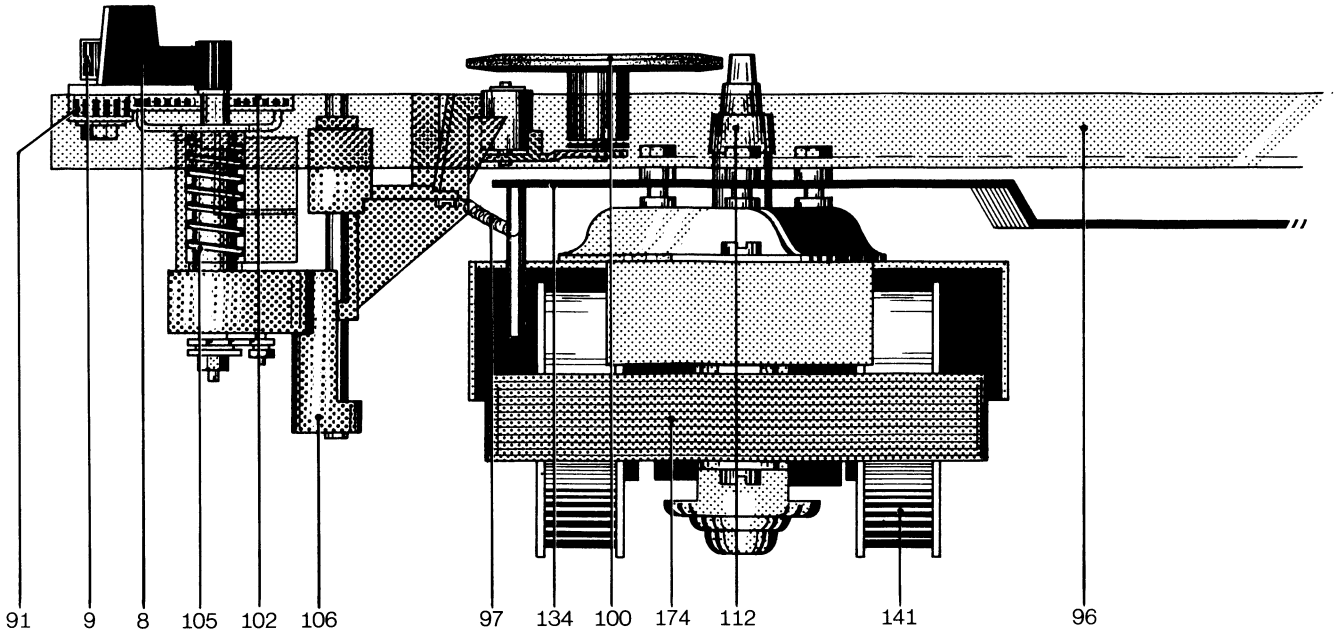
Fig. 2 Motor suspension and turntable drive



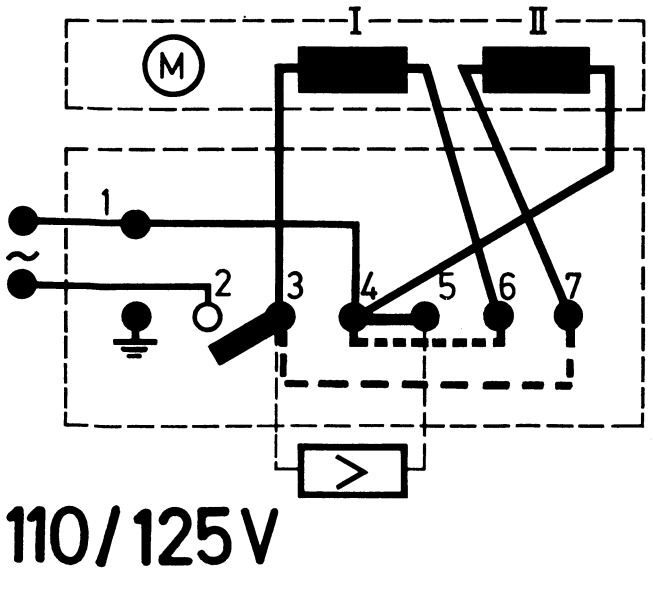
Motor and drive

Power for the turntable platter and the changing mechanism is supplied by a four-pole, split-pole synchronous motor suspended by radially located elastic mounts and having a very small stray magnetic field as well as little vibration.
The speed of the motor is independent of line-voltage, temperature or load variations. Speed is dependent on, and proportional to, power-line frequency. The motor is adapted to 50 or 60 cycle (Hz) power-line frequencies by the correct choice of the motor pulley.

Motor pulley for 50 Hz operation: part no. 218273
Motor pulley for 60 Hz operation: part no. 218274

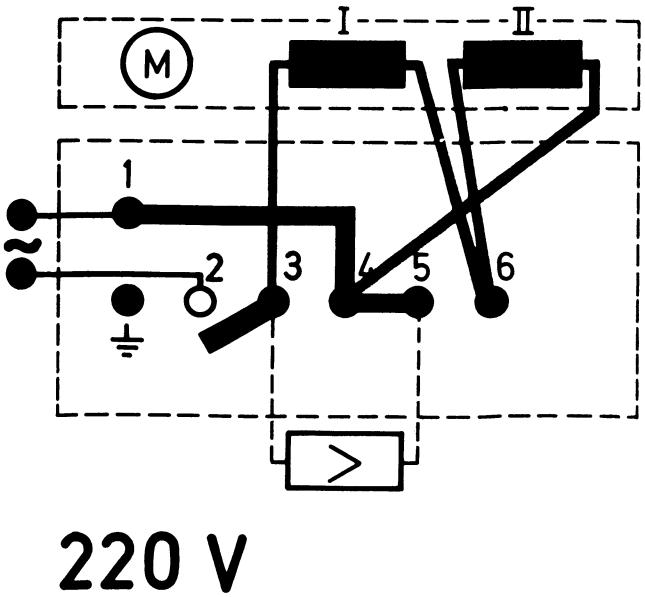
The motor pulley is fastened to the motor shaft by a setscrew. When you change pulleys, be sure that the new pulley is set at the correct height (see page 5).
The turntable platter is driven by the idler wheel (100), which, to prevent damage to its friction surfaces, is automatically disengaged when the unit is shut off. Setting the turntable speed to 33 ⅓, 45 or 78 rpm is done by raising or lowering the idler to bear against the proper step of the motor pulley.
When the operating switch (8) is actuated, the switch segment (104) rotates, whereupon the switch (97) that runs in the groove of the switch segment is brought to bear upon the drive wheel (100), lifted off the motor pulley (112) and moved vertically to the proper step on the motor pulley, corresponding to the selected speed.

Fig. 3 Motor field connections (with voltage selector)



110/125V

Fig. 4 Motor field connections (less voltage selector)

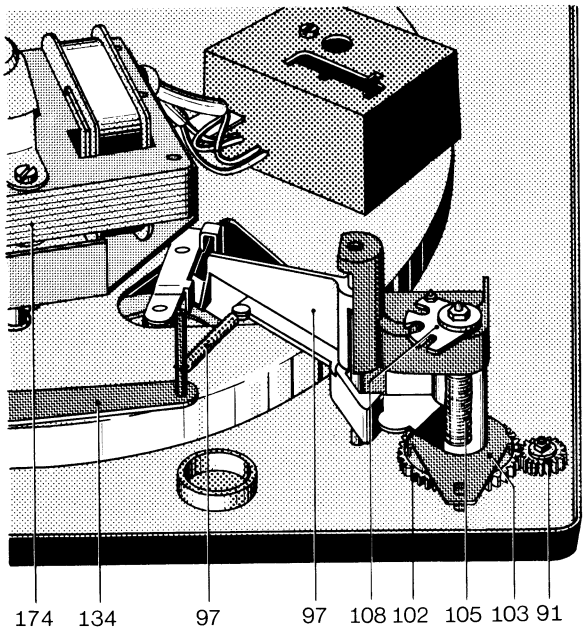


220 V

Fine-speed adjustment

A fine speed adjustment for all three speeds permits a platterspeed variation of 6% (about 1 semitone). Turning the pitch-control knob (9) causes the selector segment (104) to rotate. The switch lever assembly (97) moves up and down, changing the position of the idler wheel on whatever motorpulley step it has been placed on. The tapered shape of the motor pulley gives an adjustment range of ± 3% from the nominal speed.

Fig. 5 Turntable speeds and drive wheel shift mechanism



Symptom	Cause	Remedy
Turntable does not run when unit is plugged in and start switch operated	a) Current path to motor interrupted b) Idler wheel (100) not in contact with platter c) Motor pulley loose	a) Check connection at switch plate and voltage selector b) Check switch lever assembly (97) c) Tighten motor pulley
Turntable does not come up to speed	a) Motor pulley is not correct for local line frequency b) Slippage between idler wheel (100) and motor pulley or platter c) Excessive friction in motor, drive wheel or platter bearings	a) Change motor pulley b) Clean friction surfaces of idler wheel, motor pulley and turntable platter. If necessary, replace drive wheel. Once the drive surface of the platter has been cleaned, do not touch it with your fingers. c) Clean and oil bearings
Rumble in reproduction	Worn idler wheel	Replace idler wheel (100) and clean platter drive surface and motor pulley with greaseless solvent. Once surfaces are cleaned, do not touch them with your fingers.

Symptom
Correct nominal speed obtained only at extreme settings of pitch control

Cause
a) Idler wheel does not contact motor pulley correctly
b) The changer is resting with the bottom motor bearing on the base plate.

Remedy
a) Adjust the motor pulley vertically after loosening its setscrew (111). Or adjust the idler wheel (100) by turning its shaft after loosening the locknut. The correct position for the idler is in the center of each motor pulley step, when the pitch control is centered in its range. Retighten locknut after adjustments.
b) Eliminate the condition; changer must be suspended only by the three spring suspension points. Check idler wheel positioning.

Fig. 6 Motor pulley position

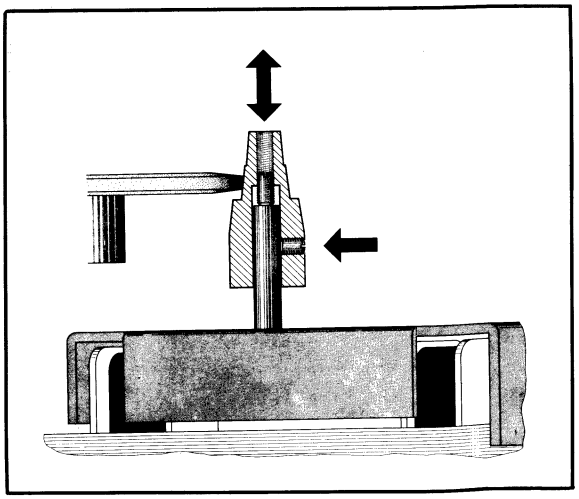


Fig. 7 Tonearm bearing assembly

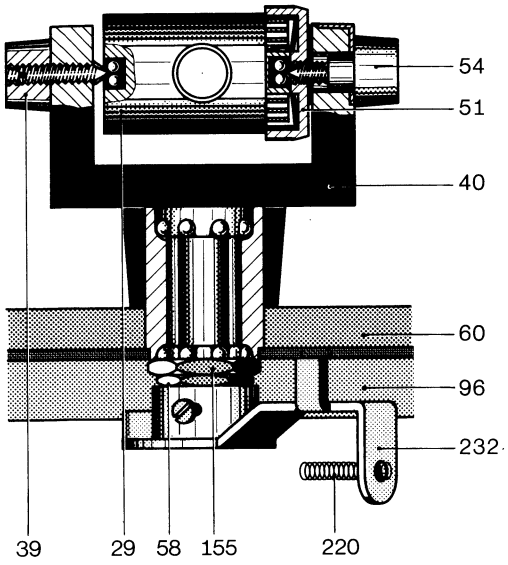


Fig. 8 Tonearm bearing assembly with anti-skating adjustment

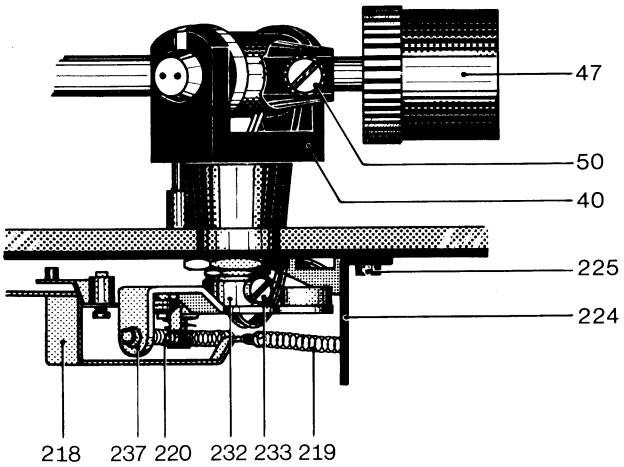
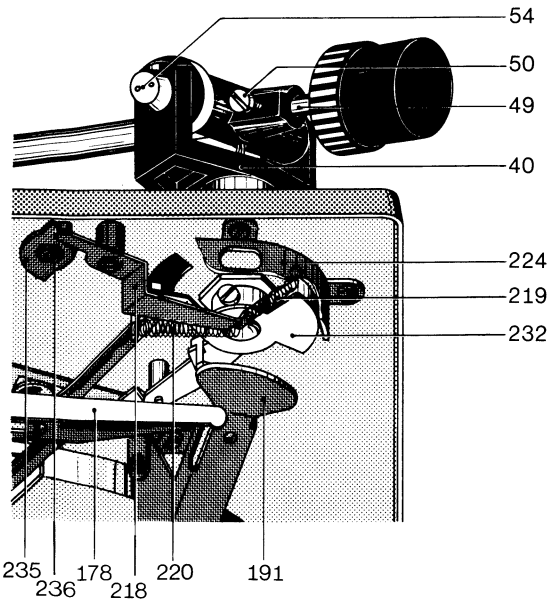


Fig. 9 Tonearm bearing assembly (under view)



The tonearm and its suspension

The all-metal "studio" tonearm of the Dual 1209 runs on vertical needle bearings and on horizontal precision ball bearings in hardened and polished races.

Vertical pivot friction = 0.01 gram } referred to
Horizontal pivot friction = 0.04 gram } stylus tip

The arm is thus able to track extremely well.
Before setting the tracking force for the cartridge being used, set the tracking-force scale to zero and balance the tonearm.

You can balance it by sliding the counterweight (47) (loosen the securing nut, 50). You can balance cartridges with a weight of 1 to 12 grams.

To reduce the effects of small shock impulses to the arm, the counterbalance weight is elastically mounted on a threaded spindle, and friction-braked to prevent undesired rotation.

By rotating the counterbalance weight in click-stops amounting to 0.01 gram change, the tonearm can be adjusted very precisely. The cartridge holder will accept all cartridges with standard mounting centers of ½ inch. Stylus force is set by turning a calibrated dial, which stresses or releases a spiral spring contained inside. The dial covers a stylus-force range of zero to 5.5 grams and is marked over that range in 0.5 gram steps.

To remove the tonearm and tonearm mounting, first unsolder the tonearm leads. Then remove the main lever (191) and the linking lever (178). Unhook the springs, remove the escutcheon plate (224) and anti-skating lever (218). After removing the lock washer (239) and the flat washer (238), the shut-off slide (221) can be removed from the main segment. After loosening the screws (231, 233), the segment can be lifted off.

To remove the nut (155), hold the bearing (56) between the deck (60) and the body (40) of the bearing with a suitable tool (such as long-nose pliers). Remove the tonearm carefully.

To re-install the tonearm and its assembly, reverse the above procedure. Before tightening screws (231, 233), check the tonearm position over the tonearm rest (20), so that the tonearm can be lowered on to the rest without binding.

After mounting the protective plate, be sure that the main segment can move through the tonearm without binding.

Before removing the tonearm assembly, set the stylus-force dial to zero.

Anti-skating adjustment

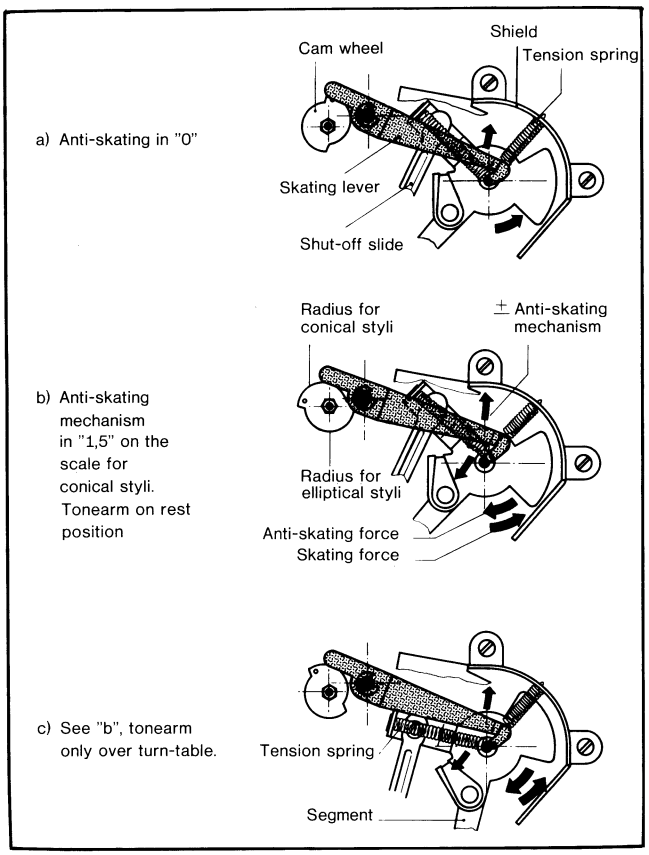
The tendency of a tonearm with an offset (angled) head to "skate" inward across the record is eliminated in the Dual 1209 by a precision anti-skating mechanism.

Skating force depends on tonearm geometry, stylus force and the tip radius of the stylus. The inward pull on the tonearm caused by the skating effect gives rise not only to an undesireable jumping of the tonearm when it is set down on the record, but also to unequal forces on the two opposite groove walls, with corresponding ill effects. This can be corrected with proper anti-skating adjustment.

By turning the anti-skating adjustment knob (59) on the chassis, an asymmetrical curved washer (235) is turned. This washer has two different curved surfaces corresponding, respectively, to the red and black scales on the anti-skating dial. The red scale is for conical (spherical-tip) styli; the black for elliptical (bi-radial) styli. When the knob is turned, the curved surfaces push the anti-skating lever (218) away from its rest position so that it applies a suitable counterforce via a spring (220).

Skating compensation is set at the factory for conical styli with a tip radius of 0.6 to 0.7 mil (.0006 – .0007 inch), and for elliptical styli with measurements of 0.20 to 0.23 mil by 0.79 to 0.87 mil. The hex adjusting nut is tightened and sealed. Readjustments should be attempted only with the help of the Dual Skate-o-meter and test record L 096. This work is best done by an authorized Dual service agency.

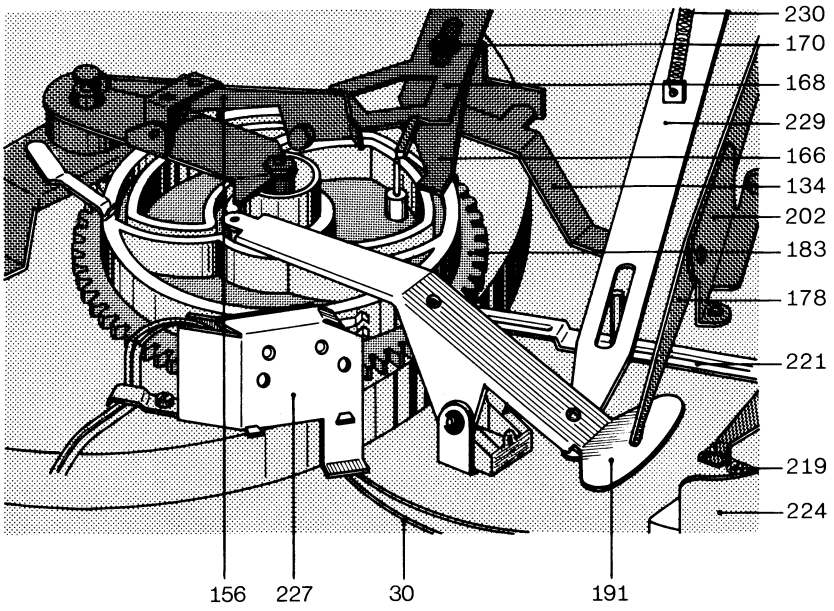
Fig. 10 Anti-skating



Troubleshooting chart:

Symptom	Cause	Remedy
Stylus skips	a) Tonearm not balanced	a) Balance tonearm according to operating instructions
	b) Stylus force too low	b) Set stylus force to cartridge manufacturer's recommended value
	c) Stylus worn or chipped	c) Replace stylus
	d) Excessive friction in tonearm bearing	e) Check tonearm horizontal pivot. Should have barely noticeable play. Adjust vertical bearing only with the left bearing screw (38) and the horizontal bearing with nut (58). Horizontal bearing is correctly adjusted when the tonearm, with anti-skating 0.5 gram, swings freely from center to rest.
	e) Ball (222) missing from shut-off rail	e) Replace ball (222)
Tonearm sets down beside tonearm rest	Arm segment (232) incorrectly adjusted	Correct adjustment: Loosen machine screws (231) and (233) and rotate segment (232) until adjustment is correct, namely when arm lowers on to rest without binding. Tighten screws.
Horizontal pivot friction too high	Tonearm is set too high on tonearm lift. Main lever jams against guide pin of lift screw assembly	Stylus should be no farther from record surface than ¼". Adjust by turning screw R 8.
Vertical movement of tonearm is impeded during set-down cycle	a) Bearing friction too high	a) Check bearing screw (38) and arm balance
	b) Lift screw (216) jams in guide sleeve of arm segment (232)	b) Remove and clean lift screw

Fig. 11 Tonearm guide mechanism



Tonearm movements

A guide groove located on the underside of the main cam (183) controls the automatic lift and set-down of the tonearm as the cam rotates through 360°. Tonearm lift and lowering are controlled by the main lever (191) and the lift screw (216). Horizontal movements are controlled by the main lever (191) and the segment (232). Setting the changer for playback of 7", 10" or 12" discs is done with the indexing lever (37). Set-down points are determined by the eccentric portion of the arm positioning slide (229) and the indexing lever (228).

Horizontal movement of the tonearm is limited by the arm segment striking the arm positioning slide (229). During the change cycle, the main lever (191) raises the arm positioning slide, bringing it within reach of the spring stud. On completion of the change cycle (set-down of the tonearm on the record), the arm positioning slide (229) is again released and returns to its normal position. It thus moves out of reach of the spring stud, permitting the tonearm to move horizontally without hindrance, while playing the record.

Tonearm lift (Cue control)

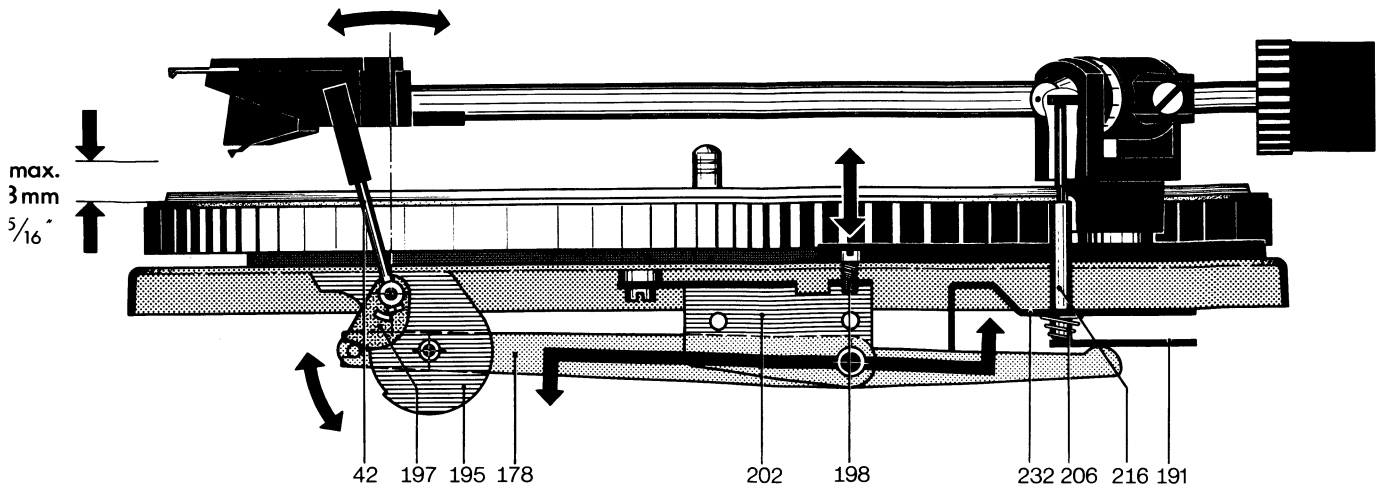
The tonearm lift permits the tonearm to be set down on the record safely at any desired point except the shut-off area (near the record label).

Pulling the tonearm lift towards the front turns the drive washer (194). This moves the connecting lever (178), main lever (191) and lift screw (216) to raise the tonearm.

After the tonearm is moved (by hand) to the desired spot on the record, the tonearm lift handle is lightly tapped towards the rear to release the mechanism. The connecting lever (178) and the leaf spring (171) of the main lever (191) are freed, allowing the tonearm to fall. The rate of fall is controlled by silicone grease on the drive washer (194).

The height of the stylus above the record can be varied from zero to about ¼" by adjusting setscrew (R 8). Turning it to the right increases the height, turning it to the left decreases the height.

Fig. 12 Tonearm lift (tonearm raised)



Troubleshooting chart:

Symptom	Cause	Remedy
Stylus jumps out of record groove	Anti-skating adjustment incorrect	See operating instructions
Tonearm misses edge of record	a) Set-down incorrectly adjusted	a) Adjust set-down with a 12"record so that stylus touches record approximately 1/16" inside edge of record. Adjustment will be correct for other sizes.
	b) Record not standard size	b) Use standard records
	c) Friction surfaces of tonearm clutch dirty	c) Clean clutch surfaces
Tonearm strikes record during change cycle	Tonearm height incorrectly set	Adjust arm height with screw (34). Height is correct when stylus tip is 1/16" to 1/8" above start switch (36) when arm is removed from rest lowered.
Tonearm does not move on to record when drop cycle is started	Damping too great; drive washer dirty	Loosen nut (192) and washer (193) and coat both sides evenly with silicone grease. Re-assemble and wipe off excess grease.
Tonearm lowers too quickly when drop cycle is started	Too little damping	Loosen nut (192) and washer (193) and drive washer (194). Clean thoroughly. Coat both sides evenly with silicone grease, re-assemble and wipe off excess.
Tonearm returns to rest immediately after being placed on record manually	Shut-off mechanism has shifted out of position during shipping	Before using changer after moving, run it through start cycle with tonearm locked on rest.

Start cycle

Moving the start switch (36) moves the switch lever (166) towards the main cam (183), initiating the following sequence.

a) The set screw of the switch lever assembly (166) turns the switch arm (134) mounted on the grooved shaft (170). Via a tension spring, this actuates the rocker assembly (97) and engages the idler (100, Fig. 2) between the platter (7) and the motor pulley (112). At the same time, the power switch (132) is actuated by the switch slide (129) through the switch arm, and the turntable begins to rotate.

b) The switch lever (166) is brought within reach of the cam follower lever (223), so that it is pushed into the change position after the rotation of the main cam.

Moving the operating switch also releases the start lever (168), pulling it towards the main cam by means of the tension spring (167). This causes coil spring to bring the shut-off lever (209) within range of the main cam dog. Thus the shut-off lever drives the main cam.

Fig. 13 Start position

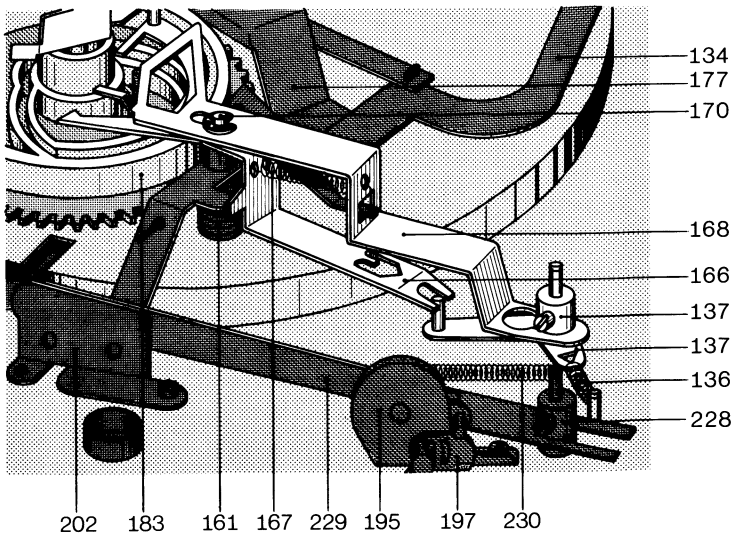
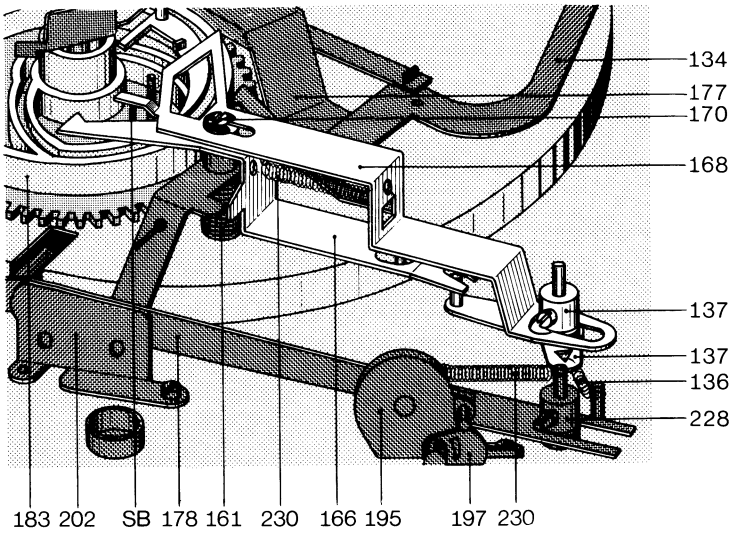


Fig. 14 Stop position



To prevent malfunctioning, the operating switch is locked during the start cycle (that is, while the main cam is turning). Just before the main cam reaches its neutral position (at the end of the change cycle), the start lever is pushed clear of the main cam by the start pin (SB) of the main cam. This restores the switch lever and operating switch to their original positions.

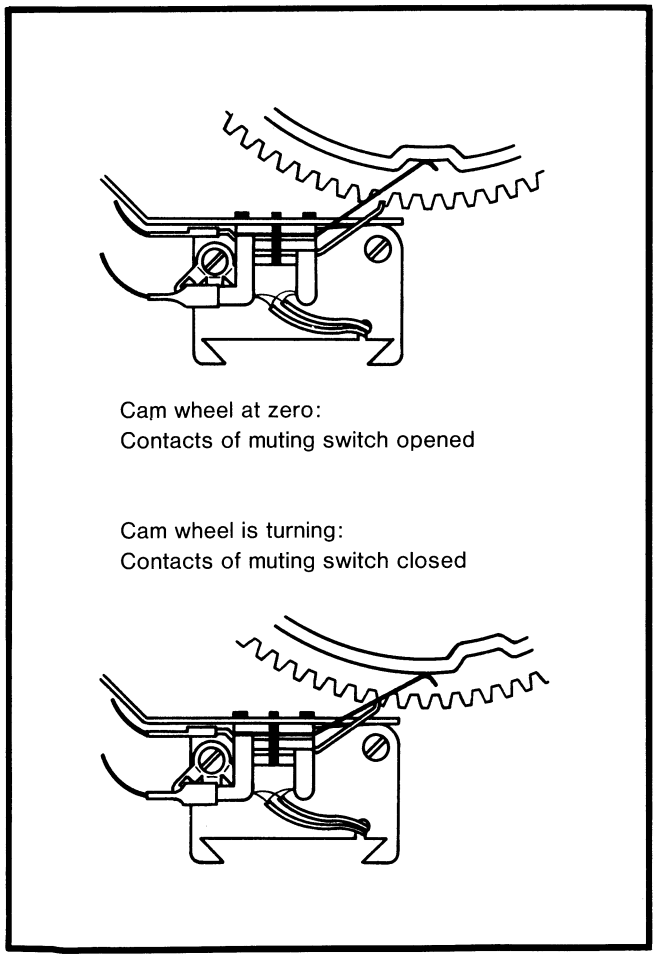
After installation and also after moving the changer, the unit should be started with the tonearm locked on the rest. This will automatically re-adjust the shut-off lever, which may have shifted out of position.

Manual start

When the tonearm (28) is swung inward by hand, the pawl on the switch arm drops into a support (BG) on the base plate, holding the switch arm in this position and the idler wheel (100) in contact with the platter. The slide (129) linked with the switch arm actuates the power switch and sets the turntable platter rotating.

On reaching the run-out groove, the tonearm automatically returns to its rest position and the unit shuts itself off. (See shut-off mechanism, next side). However, if the tonearm is lifted off the record manually and returned to the rest, the tabs of the arm segment (232) release the pawl. The torsion spring (161) then returns the switch arm to its initial position, opening the power switch and disengaging the idler wheel.

Fig. 15 Muting switch



Stop switching

When the operating lever is moved to "stop", the starting lever (168) is pushed forward. As a result the shut-off linkage comes into contact with the main cam. The swinging lever (223) remains in its stop position.

When the tonearm is on its rest and the operating lever is pushed to "stop", the operating lever must not jam.

Muting switch

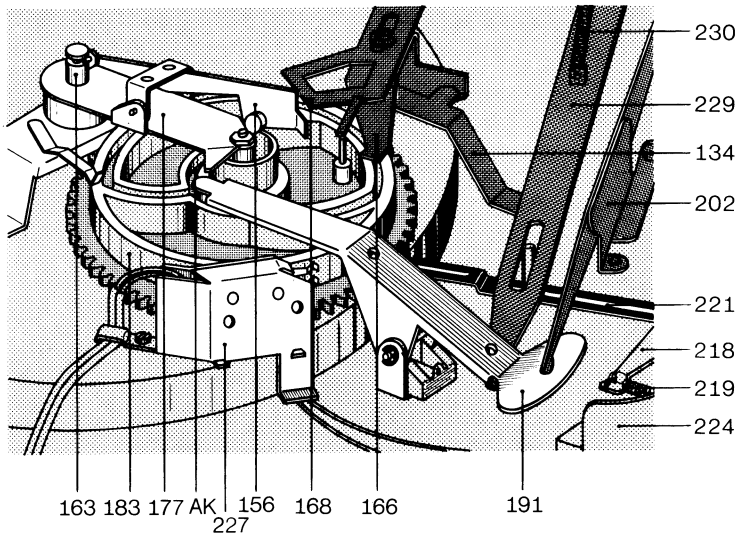
To prevent the noises of the change cycle from being sent through the audio system, the apparatus is fitted with a short-circuiting (muting) switch (226). The switch springs (S) for both channels are actuated by the main cam (183). In the tonearm rest position, the muting switch is opened.

Record drop

Insert the appropriate spindle – AW 3 for standard records (7 mm center hole) or AS 12 for 45 rpm records (38 mm center hole).

Record-drop is initiated by the rotation of cam (183), whose cam surface (AK) guides the cam rocker (156), pushing the change actuator stud (159) and releasing a record by means of the automatic spindle. The main cam is designed so that a record can drop only when the tonearm is above the tonearm rest and thus out of the reach of the largest possible record (12" diameter).

Fig. 16 Record drop



Shut-off and change cycle

The dog (M) on the turntable platter gear (PR) and the shut-off lever (209) actuate both the change cycle at the end of the record as well as the shut-off after the last record in a stack is played.

At the end of a record, the tonearm moves towards the center at an accelerated rate due to the increased pitch of the grooves. This motion carries the shut-off lever (209) towards the dog by means of the shut-off slide (221). The eccentric dog pushes the shut-off lever (209) back at each revolution as long as the tonearm advance is only one normal record groove.

The run-out groove with its steeper pitch moves the shut-off lever against the dog with greater force, engaging the shut-off lever (209) and causing the main cam (183) to be driven out of its neutral position by the turntable platter gear.

Fig. 17 Actuating "change" or "shut-off"

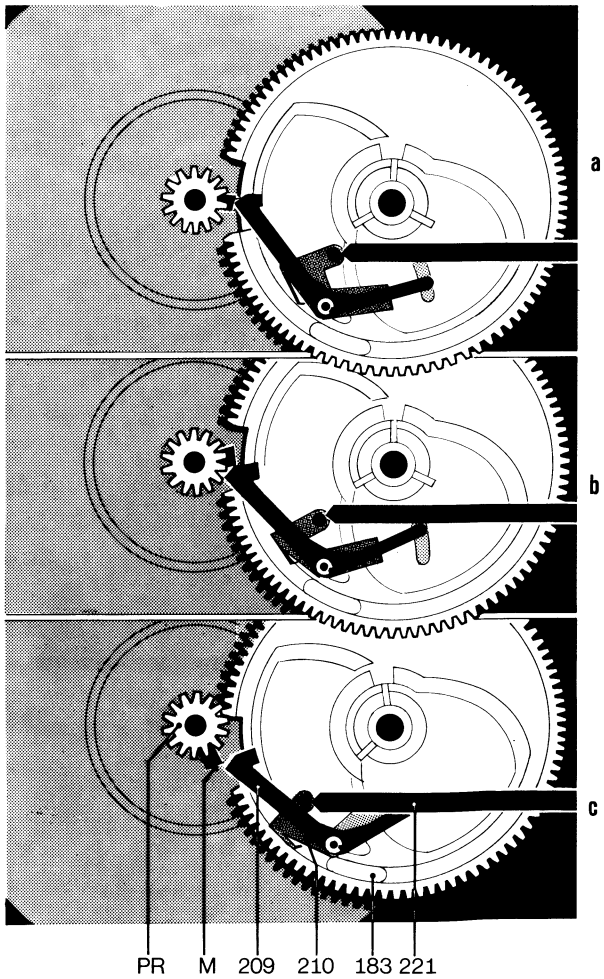
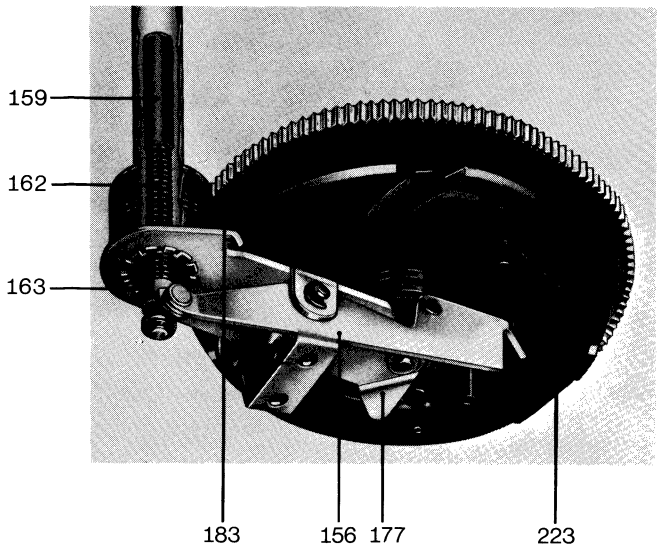


Fig. 18 Change cycle



Shut-off mechanism

Shut-off and change functions are determined by the position of the cam follower lever (223). After every start or record-drop, the cam follower lever is brought to its stop position by the main lever (191) (longer end towards the center of the main cam). As the record is dropped the cam follower lever (223) is turned to its start position by the cam rocker (156), so that the tonearm can swing in toward the record and be lowered on to it. If there are no more records on the spindle, and the cam rocker cannot turn the cam follower lever, the lever remains in its stop position and allows the tonearm to swing to its rest position.

When the main cam (183) returns to its neutral position, the switch arm (134) drops into a cut-out in the main cam, opening the power switch (132) and disengaging the drive idler (100).

Fig. 19

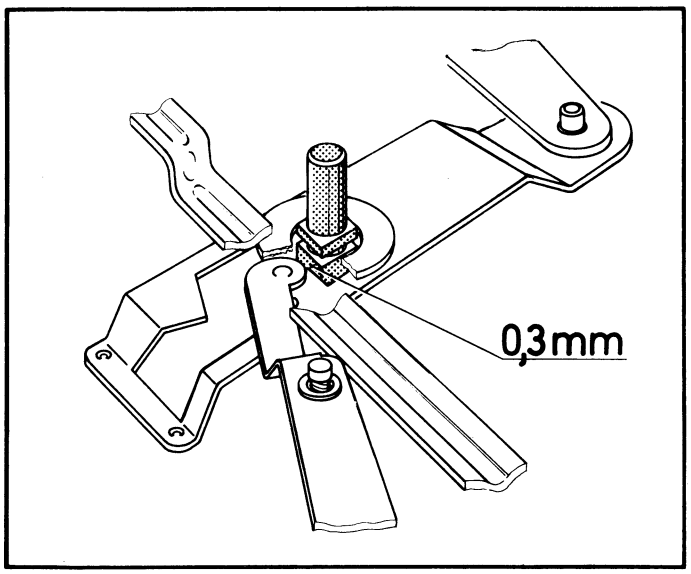
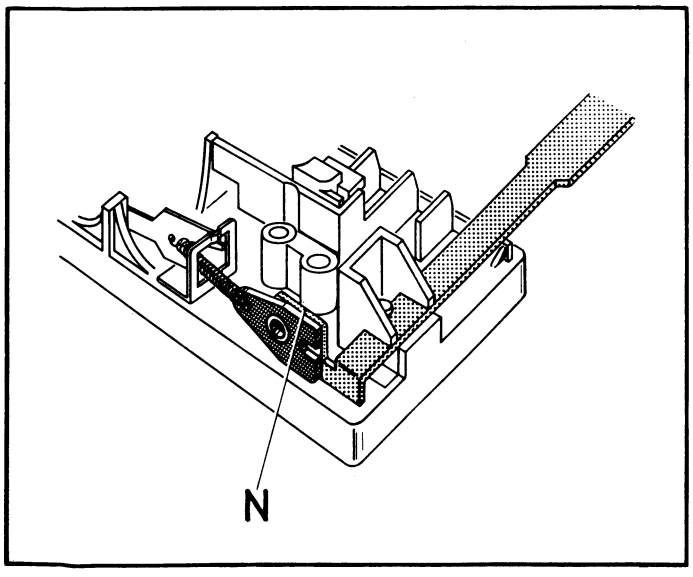


Fig. 20



Troubleshooting chart

Symptom
Turntable stops after automatic setdown of the tonearm

Cause
a) Switch arm (134) is not latched by pawl (180)
b) Power switch opens

Remedy
a) Loosen screw and turn the short arm piece on the long switch-arm piece. Move the tonearm in and turn the main cam to its neutral position and adjust for about 1/64" play between cam and rectangular bolts riveted into the chassis.

b) As the tonearm moves in, switch slide (129) must overtravel by about 1/64". Its tab must engage the switch.

Symptom
Last record keeps repeating

Cause
Defective spindle

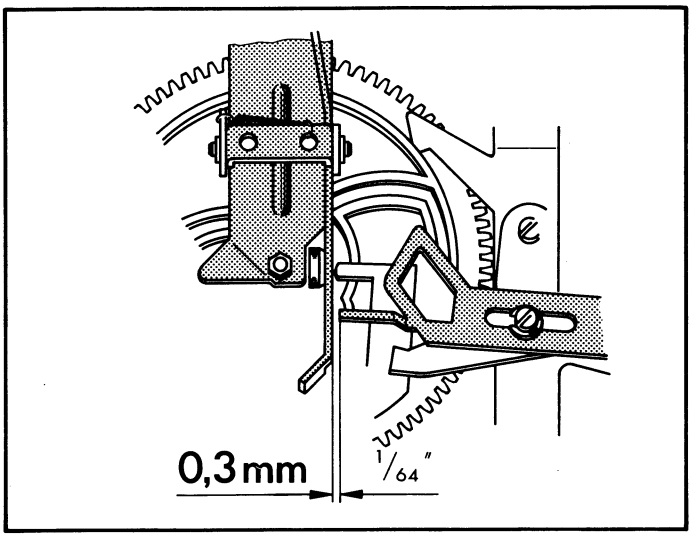
Remedy
Replace spindle

Symptom
Record does not drop when unit is switched to "start"

Cause
Inadequate engagement between change lever and cam rocker (156)

Remedy
Adjust clearance between change lever and cam rocker to 1/64" minimum with apparatus in "start" position.

Fig. 21

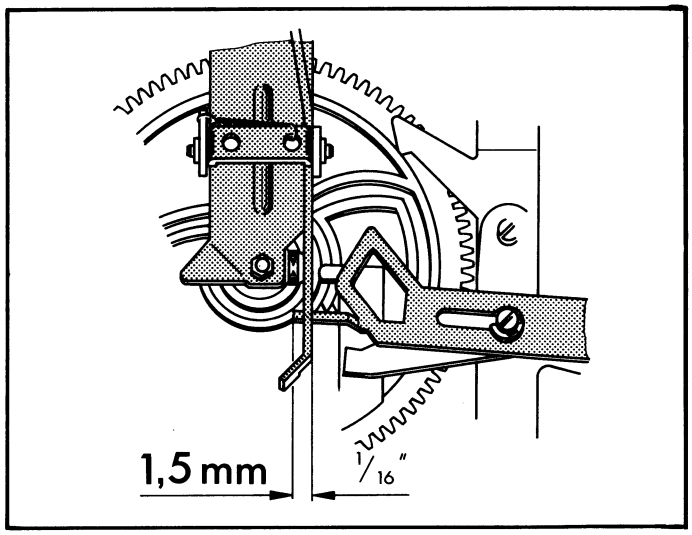


Symptom
Record drops when unit is switched to "stop"

Cause
Cam rocker (156) not caught by start lever

Remedy
Adjust cam rocker so that at the conclusion of the "stop" function the start lever runs about 1/16" under the follower.

Fig. 22



Symptom
Records do not drop

Cause
Cam rocker (156) has too little force (travel)

Remedy
Re-adjust eccentric so that when the three supports in the automatic spindle are held in and the main cam is at its neutral, pressing the change screw moves the support about 1/64".

Fig. 23

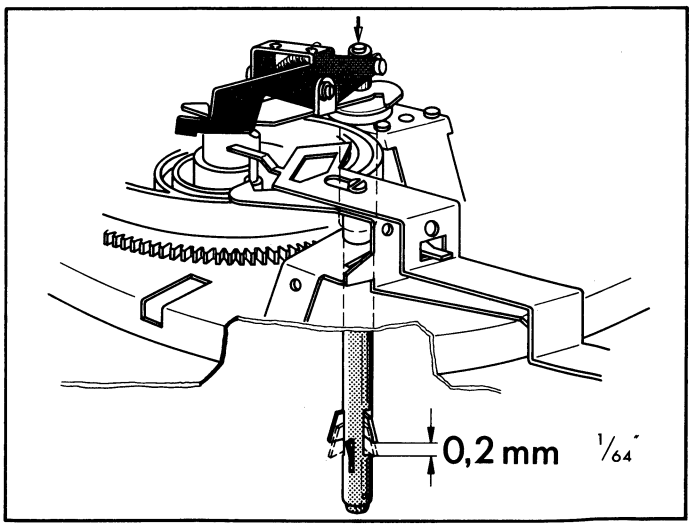
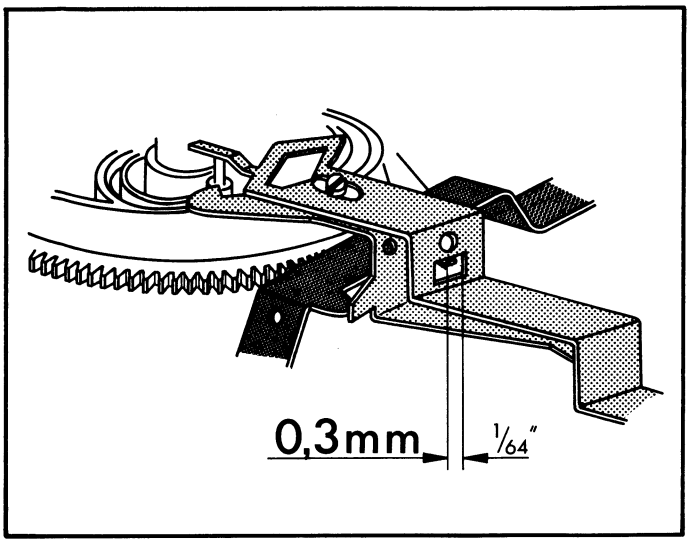


Fig. 24



Symptom
Switch latches into "stop" position when tonearm is at rest.

Cause
Too much clearance between tab on switch arm (134) and start lever (168).

Remedy
Adjust tab on switch arm so that it clears start lever by 1/64" when main cam is in neutral position.

Troubleshooting chart:

Symptom	Cause	Remedy
Tonearm moves with stylus force and anti-skating force at zero: a) outward; b) inward	a) Anti-skating out of adjustment	a) Adjust skating lever so that horizontal movement of tonearm causes no movement of anti-skating spring.
	b) Too-taut tonearm leads produce a twisting force	b) Allow some slack in tonearm leads
During change, stop and start operations, noises from the mechanism can be heard in system speaker	Muting switch misadjusted. Distance between contact springs and shorting contact is too great	Bend contacts so that, in the neutral position of the main cam the spacing between contacts is about 0,02 inch. Clean contacts.
No sound	Spacing too small	See above
Motor will not shut off when tonearm is on arm rest	Capacitor across power switch is shorted	Replace capacitor (0.1 μF, 700 V)
Acoustic feedback	a) Chassis parts (for example leads) are touching base cut-out	a) Correct cut-out according to instructions supplied with unit. Move cables.
	b) Connecting cables are too taut	b) Allow more slack in cables

Spare parts

Ref. No.	Part	Description	Quantity per unit	
1	215470	Automatic spindle AS 12	1	
2	213895	Changing spindle AW 3	1	
3	201208	Facing ring for turntable mat	1	
4	214056	Washer	1	
5	200543	Retaining ring	1	
6	218385	Turntable mat assembly	1	
7	218388	Turntable (pos. no. 3, 4, 5, 6)	1	
8	217237	Speed change lever, left	1	
9	217241	Pitch-control knob	1	
11	219008	Blind (cm)	1	
	219006	Blind (inch)	1	
12	217230	Chassis, complete	1	
13	214210	Shipping screw assembly	2	
14	210816	Machine screw AM 4 x 4	2	
15	201095	Centering disc	1	
16	201101	Centering pin	1	
17	210182	Bowed lockwasher	1	
18	210630	Washer	1	
19	210197	Grip ring G 4 x 0,8	1	
20	217301	Tonearm rest assembly	1	
21	216510	Leaf spring	1	
22	216511	Threaded bolt	1	
23	210362	Hex nut BM 3	1	
24	210816	Machine screw AM 4 x 4	2	
25	210366	Hex nut BM 4	7	
26	219012	Tonearmhead, complete	1	
27	210361	Hex nut M 3	4	
28		Tonearm assembly	1	
		(only available complete as pos. no. 26 and 52)		
29	217904	Tonearm, complete	1	
30	214000	Contact block complete	1	
31	217706	Isolation foil	1	
32	201132	Lift	1	
33	215430	Cartridge mount TK 14	1	
34	218636	Position screw	1	
35	207839	Damping ring	1	
36	217247	Speed change lever left, complete	2	
37	217247	Speed change lever right, complete	2	
38	217438	Threaded pin	1	
39	200829	Stop nut	1	
40	217269	Tonearm bearing support	1	
41	210146	"C" ring 3,2	4	
42	216881	Arm lift lever, complete	1	
43	210353	Hex nut BM 2	1	
44	216106	Pin 2 x 6	3	
45	217905	Damping piece	1	
46	214047	Special screw (pierced)	2	
	214211	Special screw (threaded)	2	
47	218387	Counterbalance assembly	1	
48	217528	Lockwasher	1	
49	217305	Spindle with lockwasher	1	
50	216545	Securing nut	1	
51	217894	Spring barrel complete	1	
52	217595	Bracket complete with bearing housing	1	
53	216504	Indicator	1	
54	217436	Bearing screw assembly	1	
55	200567	Bearing race with balls	2	
56	216310	Bearing housing	1	
57	200567	Bearing race with balls	2	
58	201149	Stop nut	1	
59	217410	Turning button	1	
60	217890	Dress-up plate	1	
61	200721	Bushing isolation mount	3	
62	200728	Compression spring isolation mount	3	
63	200723	Rubber insert isolation mount	3	
64	200722	Steel cup	3	
64 a	200579	Spring mounted footing (1 set = 3 pieces)	3	
65	210366	Hex nut BM 4	7	
66	210624	Washer	2	
67	210713	Washer	2	
68	201632	Rubber washer	2	
69	200712	Spring cup	2	
70	210624	Washer	2	
71	200718	Compression spring	2	
72	200711	Lockwasher	2	

Fig. 25 Exploded view, parts above chassis

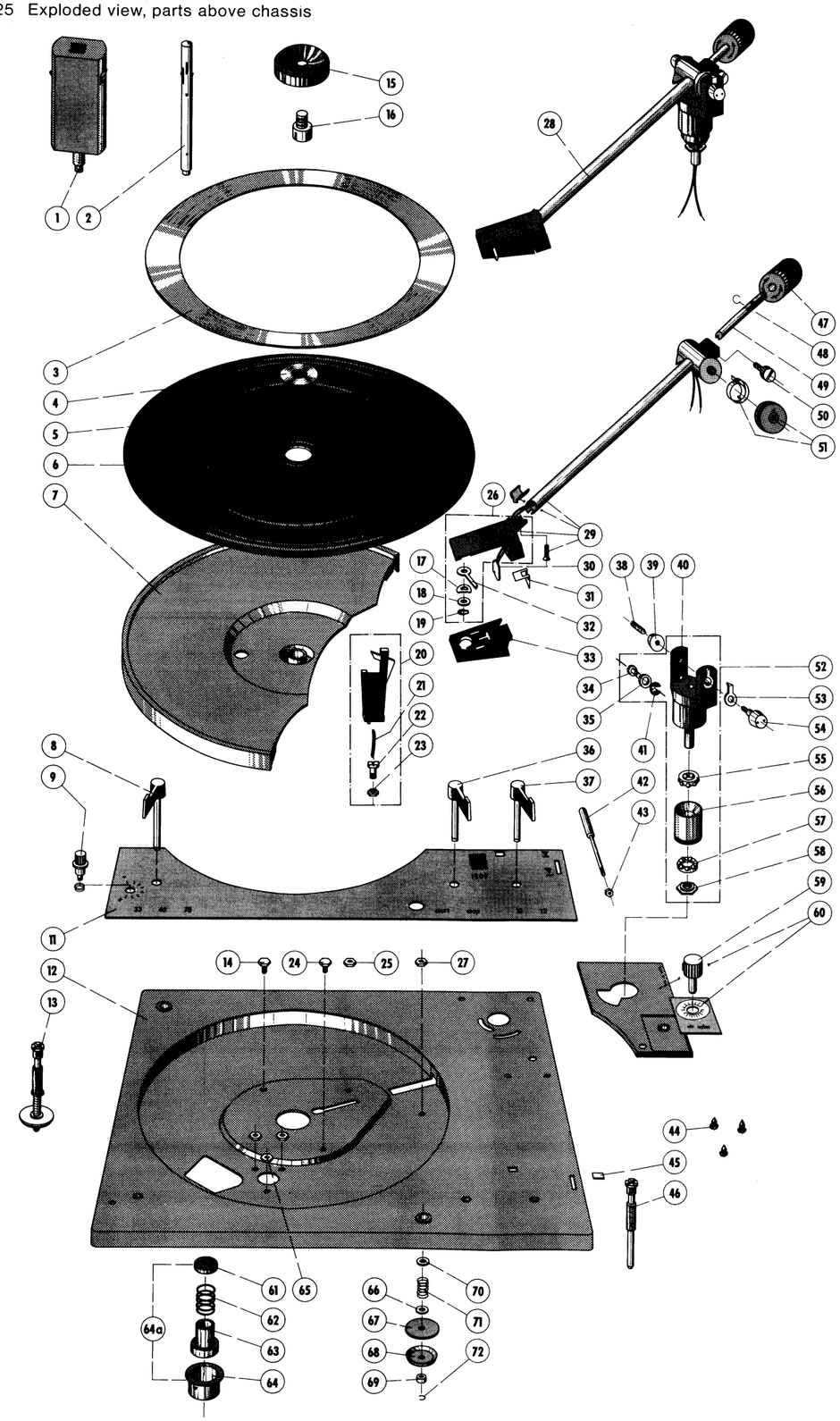
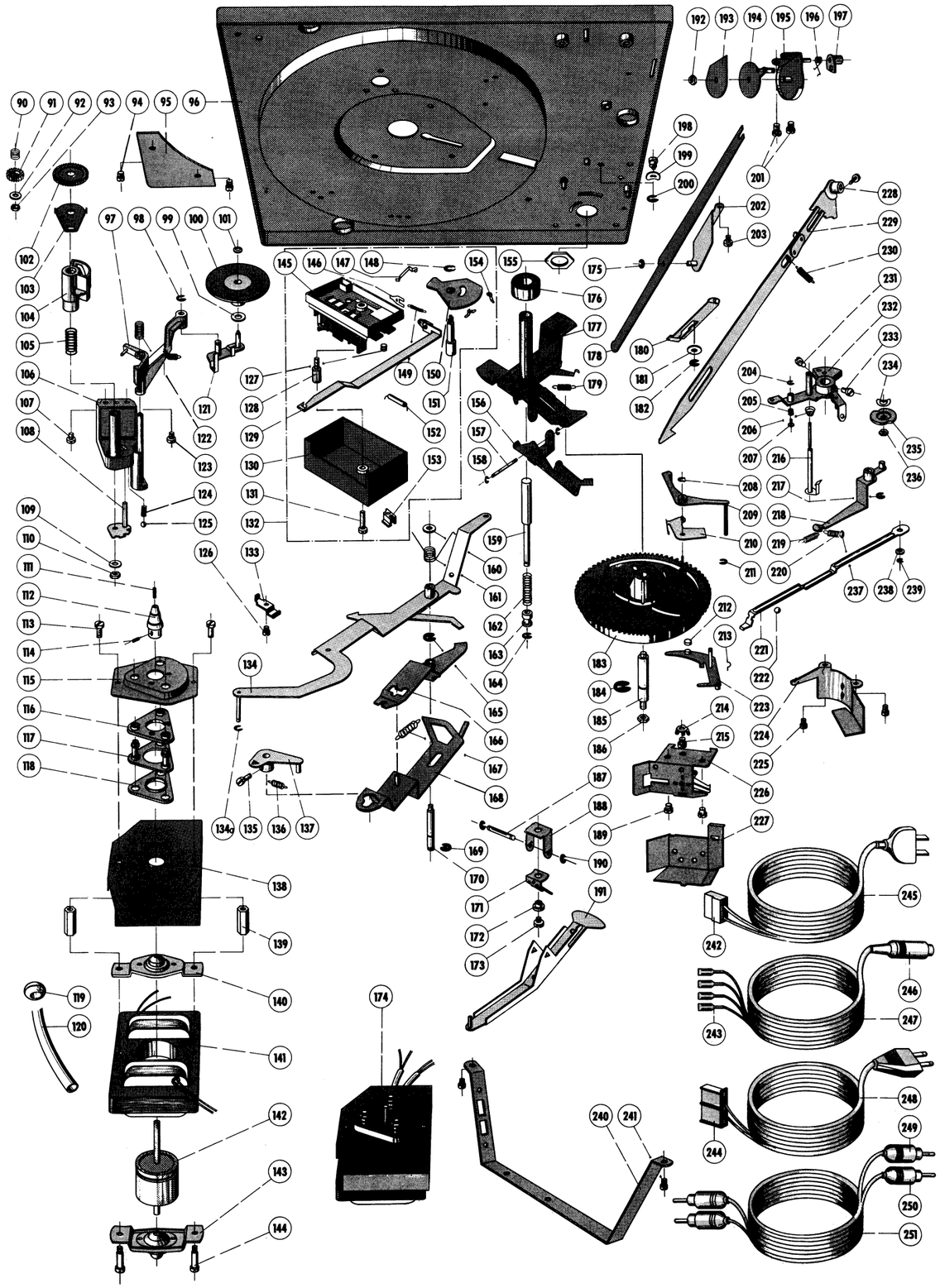


Fig. 26 Exploded view, parts below chassis



Ref. No.	Part	Description	Quantity per unit	
90	217 376	Compression spring	1	
91	217 026	Cam wheel	1	
92	210 586	Washer	1	
93	210 361	Hex nut M 3	4	
94	210 512	Machine screw AM 4 x 5	2	
95	200 612	Plate	1	
96	217 230	Base plate assembly	1	
97	217 234	Switch lever assembly with tension spring	1	
98	210 146	"C" ring 3,2	4	
99	200 110	Washer	1	
100	217 888	Idler wheel assembly	1	
101	200 633	Lockwasher	1	
102	217 027	Speed regulator wheel	1	
103	217 233	Speed regulator detent	1	
104	217 028	Switching segment	1	
105	216 736	Compression spring for switching segment	1	
106	216 558	Support assembly	1	
107	210 475	Machine screw AM 3 x 5	12	
108	217 239	Groove detent	1	
109	210 642	Washer	1	
110	210 361	Hex nut M 3	4	
111	217 751	Threaded pin M 2,6 x 8	1	
112	218 273	Motor pulley 50 cycle, complete	1	
	218 274	Motor pulley 60 cycle, complete	1	
113	210 509	Machine screw AM 3,5 x 8	1	
114	210 220	Threaded pin M 2,6 x 3,5	1	
115	204 669	Dress-up plate	1	
116	204 668	Isolation mount plate	1	
117	215 846	Mounting bracket assembly	1	
118	204 666	Isolation washer lower	1	
119	209 939	Sleeving	1	
120	217 727	Insulating sleeve	1	
121	217 244	Idler arm assembly	1	
122	216 737	Compression spring for switch lever	1	
123	210 475	Machine screw AM 3 x 5	12	
124	216 745	Compression spring for grooving	1	
125	209 358	Steel ball 4 Ø	1	
126	210 475	Machine screw AM 3 x 5	12	
127	213 969	Roller for switch slide	1	
128	214 181	Screw bolt	1	
129	213 970	Switch slide assembly	1	
130	217 062	Switch cover with voltage selector	1	
	214 207	Switch cover less voltage selector	1	
131	210 492	Machine screw AM 3 x 15	1	
132	217 059	Switch assembly with voltage selector	1	
	214 205	Switch assembly less voltage selector	1	
133	200 447	Cable clamp for audio cable	1	
134	217 889	Switch arm, complete	1	
134 a	210 145	"C" ring 2,3	8	
135	218 583	Machine screw with set screw AM 3 x 4	1	
136	216 777	Tension spring	1	
137	216 773	Manual / auto selector lever assembly	1	
138	204 663	Motor shield	1	
139	200 167	Motor spacer	2	
140	215 843	Motor bearing top (housing)	1	
141	218 386	Stator complete	1	
142	218 389	Rotor	1	
143	215 840	Motor bearing lower (housing)	1	
144	215 848	Motor shield	2	
145	217 060	Switch plate with voltage selector	1	
	214 206	Switch plate less voltage selector	1	
146	213 966	Snap spring	1	
147	214 176	Screen spring	1	
148	210 196	"C" clip	1	
149	213 968	Tension spring	1	
150	214 174	Contact support	1	
151	214 173	Speed spindle	1	
152	203 725	Capacitor	1	
153	213 978	Locking device, small, for power switch housing	1	
	213 979	Locking device, large, for power switch housing	1	
154	214 175	Contact spring	2	
155	200 685	Hex nut	1	
156	213 922	Cam rocker	1	
157	217 813	Spindle	1	
158	210 145	"C" ring 2,3	8	
159	213 918	Change actuator complete	1	
160	210 586	Washer	1	
161	213 940	Torsion spring	1	

Ref. No.	Part	Description	Quantity per unit	
162	213920	Compression spring	1	
163	213921	Bushing	1	
164	210145	"C" ring 2,3	8	
165	210147	"C" ring 4	3	
166	218538	Switch lever assembly	1	
167	200103	Tension spring	1	
168	217258	Start lever	1	
169	210147	"C" ring 4	3	
170	217334	Grooved shaft	1	
171	201186	Leaf spring	1	
172	200458	Spacer	1	
173	210480	Machine screw AM 3 x 6	2	
174	218384	Synchronous motor compl. packed up	1	
175	210145	"C" ring 2,3	8	
176	200554	Ball bearing assembly	1	
177	214201	Bearing support assembly	1	
178	217300	Connecting lever	1	
179	213925	Tension spring	1	
180	213942	Latch complete	1	
181	202043	Washer	1	
182	210146	"C" ring 3,2	4	
183	214202	Cam wheel compl. packed up	1	
184	210149	"C" ring 6	1	
185	200519	Bearing post for cam wheel	1	
186	210366	Hex nut BM 4	7	
187	200528	Shaft	1	
188	201185	Main lever bracket	1	
189	210475	Machine screw AM 3 x 5	12	
190	210145	"C" ring 2,3	8	
191	201094	Main lever compl. packed up	1	
192	210366	Hex nut BM 4	7	
193	201195	Cover washer	1	
194	217290	Drive washer	1	
195	217286	Support bracket assembly	1	
196	217296	Torsion spring	1	
197	217293	Drive cam assembly	1	
198	201159	Set screw	1	
199	210187	Bowed lockwasher	1	
200	210147	"C" ring 4	3	
201	210469	Machine screw AM 3 x 3	2	
202	217297	Main lever bracket assembly	1	
203	210511	Machine screw AM 4 x 4	1	
204	210143	"C" ring 1,5	1	
205	201174	Compression spring	1	
206	201179	Conical spring	1	
207	200686	Spring pin	1	
208	210194	"C" clip	1	
209	200558	Shut-off lever	1	
210	200557	Friction plate	1	
211	210145	"C" ring 2,3	8	
212	200650	Sleeve	1	
213	200522	Snap spring	1	
214	211614	Solder lug	1	
215	210475	Machine screw AM 3 x 5	12	
216	218703	Lift rod	1	
217	210146	"C" ring 3,2	4	
218	217281	Skating lever	1	
219	217948	Tension spring	1	
220	218591	Tension spring for anti-skating	1	
221	200688	Shut-off slide	1	
222	209358	Steel ball 4 mm Ø	1	
223	214203	Cam follower lever complete with sleeve	1	
224	217285	Cover plate	1	
225	210475	Machine screw AM 3 x 5	12	
226	207447	Muting switch	1	
227	201240	Shield	1	
228	217264	Record size selector lever assembly	1	
	218583	Machine screw AM 3 x 4	1	
229	217276	Arm positioning slide assembly	1	
230	200453	Tension spring for arm positioning slide assembly	1	
231	210482	Machine screw AM 3 x 6	1	
232	217891	Segment complete, packed up	1	
233	210480	Machine screw AM 3 x 6	2	
234	216867	Bowed lockwasher	1	
235	217895	Cam washer	1	
236	210361	Hex nut M 3	4	
237	201184	Record size selector disc	1	
238	201187	Friction disc	1	

Ref. No.	Part	Description	Quantity per unit	
239	210145	"C" ring 2,3	8	
240	217617	Stand	1	
	217759	Stand with phono jacks	1	
241	210475	Machine screw AM 3 x 5	12	
242	209457	Inner casing for AMP-plug	1	
243	209436	Lug (amp)	4	
244	213980	Input jack housing	1	
245	207311	Power cord, U.S. type plugs	1	
	213984	Power cord, with U.S. type plug and 5-pole Dual plug	1	
246	209424	Miniature plug	1	
247	207303	Plug-in output cable	1	
248	218625	Power cord, with Dual plug	1	
249	209425	Phono plug, yellow	2	
250	209426	Phono plug, red	2	
251	207299	Audio cable, phono connector	1	
*	210096	Plastic grip for power cord	1	
*	210475	Machine screw AM 3 x 5	12	
*	214219	Packing carton complete	1	
*	217392	Operating instructions	1	
*	217391	Mounting instructions	1	

* Not illustrated

Alteration reserved

Lubrication

All bearings and sliding points have been properly lubricated during assembly. Re-lubrication is normally not necessary for about two years since all important bearings are provided with oil retainers and sintered bearings.

Lubrication should be applied sparingly. It is of primary importance that no oil or grease should get onto the friction surfaces of the drive wheel, motor pulley or turntable, to avoid slippage. For the same reason, avoid touching these parts.

Use the following lubricants:

- □ Shell Alvania No. 2
- × Isoflex PDP 40
- ○ BP oil, Super Viskostatic 10 W/30
- ☒ Wacker siliconoil AK 500000
- △ Adhesive oil, Renotac No. 342

Fig. 27 Chassis, viewed from above

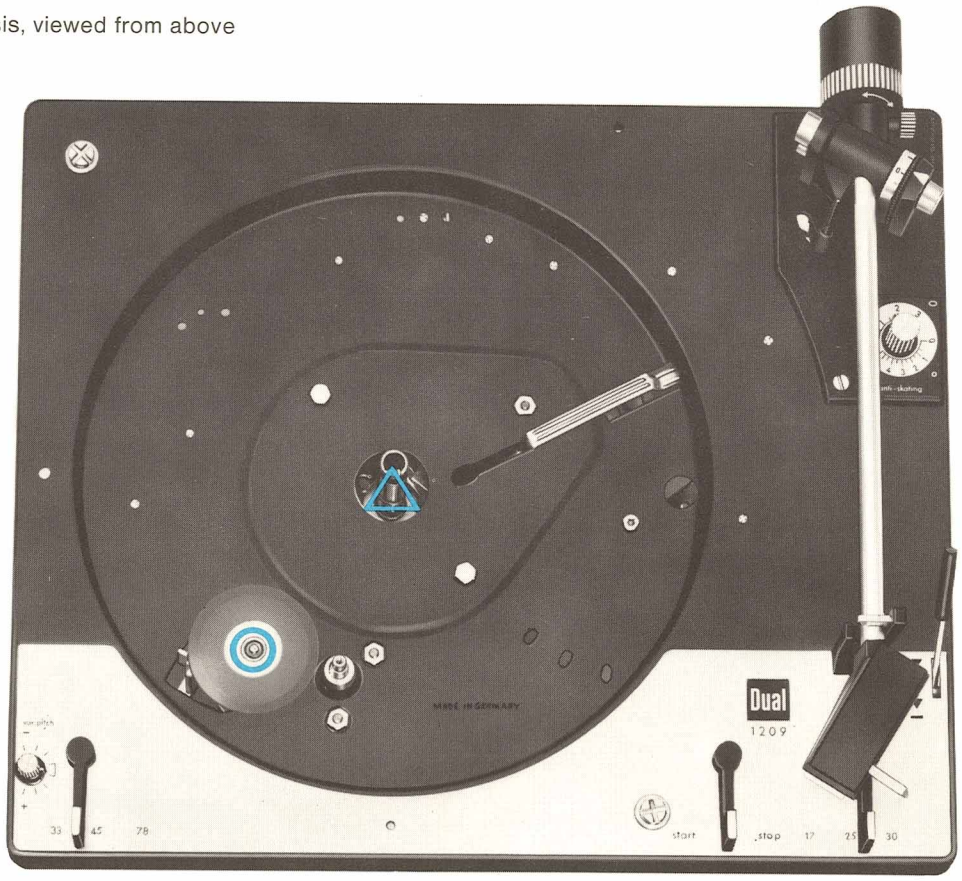


Fig. 28 Chassis, viewed from below